

elements to quadratures and thus to complete the solution. I notice that whilst the time may fairly be said to be eliminated, the space element may be more properly said to undergo the negative process, if it may be so called, of ab-elimination; it is not introduced into and then expelled from, but prevented from ever making its appearance at all in the resolving system of differential equations. It is from the study of one of these allied but more difficult questions that the present memoir has taken its rise as a collateral inquiry and elucidatory digression.

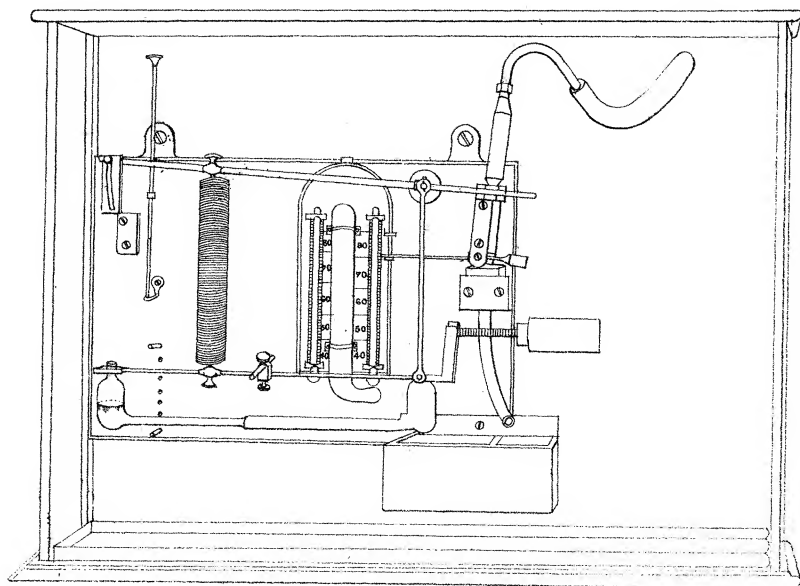
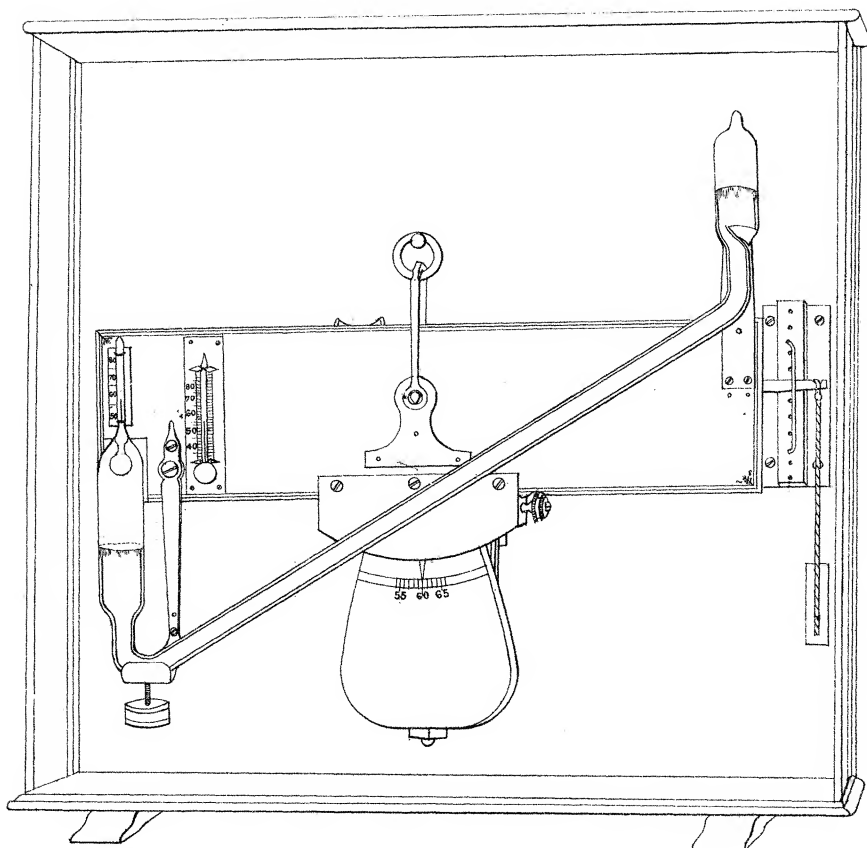
II. "On Appold's Apparatus for regulating Temperature and keeping the Air in a Building at any desired degree of Moisture." By J. P. GASSIOT, Esq., V.P.R.S. Received May 3, 1866.

Those Fellows of the Royal Society who were acquainted with the late Mr. John George Appold, have often expressed their admiration at the various scientific arrangements which he from time to time adapted to his dwelling-house in Wilson Street, Finsbury Square. However intense might be the frost of winter or the heat of summer, or the brilliancy of the gas with which his rooms were lighted, when once under his hospitable roof you enjoyed a pure and refreshing atmosphere. Much of this was undoubtedly due to the steam-power he always had at command connected with his business premises immediately adjacent to his dwelling-house, by which he could at any time force a current of fresh air at a given temperature into any of his rooms; indeed Mr. Appold always contended that houses could not be made thoroughly comfortable as habitations without the aid of steam-power. But among the many of his arrangements to obtain equable temperature in rooms, there were also those that do not require the aid of steam-power, so seldom applicable in private dwellings, and which, being easy of adaptation, might be used in private houses with much advantage as regards the health and comfort of the inmates. I allude to his Automatic Temperature regulator, and to his Automatic Hygrometer; and these instruments, as originally constructed by her late husband, and used for many years in their house, but now repaired and placed in perfect working order by Mr. Browning, Mrs. Appold has requested me to offer in her name to the President and Council of the Royal Society. She desires me to express a hope that they will oblige her by retaining them among the other scientific apparatus belonging to the Royal Society, as a mark of respect to the memory of one who always highly esteemed the honour he received when he was elected into that body in June 1853.

I annex a description and drawing of both instruments (Plate VII).

*Appold's apparatus for regulating the temperature of buildings automatically.*

This instrument consists of a glass tube having bulbs at each end. The



APPOLD'S AUTOMATIC HYGROMETER.

tube is filled, as also about half of each bulb, with mercury; the lower bulb containing ether to the depth of half an inch, which floats on the mercury. The tube is secured to a plate of boxwood, and supported on knife-edges, on which it turns freely. At the end of the plate, underneath the highest bulb, is a lever, to which a string is attached. This string is carried, by means of bell-cranks, to the supply-valve of a gas-stove, or the damper of a furnace.

The instrument acts in the following manner:—Supposing the stove to be lighted and to have raised the temperature more than is required, the heat will convert a portion of the ether in the lower bulb into vapour. The expansion of this vapour drives a quantity of the mercury out of the bulb underneath it through the tube into the upper bulb. The end to which the mercury has been driven being thus rendered the heaviest falls, and motion being communicated by the lever to the string, this closes the supply-valve or damper of the stove or furnace. Of course, if this should be carried beyond the required extent the reverse action will take place.

A weight in the centre of the plate, the position of which is regulated by a milled-head screw shown at the side, serves to alter the centre of gravity of the whole apparatus. The value of the motion of this weight being carefully ascertained, a scale is engraved upon it. By moving this weight, according to a scale engraved on it, the instrument may be set so as to maintain any desired temperature in the building in which it is fixed.

The range of action of the instrument is from  $54^{\circ}$  to  $66^{\circ}$  Fahr., and with a change of temperature of one degree it has the power to raise one ounce three inches.

*Appold's automatic Hygrometer for keeping the Air in a Building at any desired degree of moisture.*

This instrument, both in principle and construction, is very similar to the automatic regulator just described. The acting portion consists also of a tube with a bulb at each end. This tube contains mercury to about half the height of each bulb, and a portion of ether floating on the mercury at each end. One half of the tube and one bulb is covered with bibulous paper, which is always kept wet, and the tube is suspended and turns freely on knife-edges placed just above the covered bulb. The action of the apparatus is as follows:—

A deficiency of moisture in the air increases the evaporation from the bibulous paper. This evaporation produces cold, which condenses the vapour of the ether in the covered bulb, and the mercury being pressed on by the vapour of the ether in the naked bulb is forced into the covered bulb. The uncovered bulb, being now much the lightest, rises, and raises a lever, which in its turn opens a valve at the end of a small tube. This tube communicates with a cistern kept full of water. The water which is thus admitted is suffered to trickle over heated pipes which are covered

with bibulous paper; upon the desired dew-point being attained, the action ceases.

The range of the instrument is regulated by means of a spiral spring at one end of the tube, and an adjustable weight at the other.

By means of a pencil attached to one of the levers, the instrument may be made self-registering.

An ordinary Mason's hygrometer is attached to the instrument for regulation and comparison.

With a variation of one degree in the moisture of the atmosphere, the instrument is capable of supplying ten quarts of water per hour to the surface of the pipes from which it evaporated.

### III. "On the Spectrum of a New Star in Corona Borealis"\*. By WILLIAM HUGGINS, F.R.S., and W. A. MILLER, M.D., Treas. R.S. Received May 17, 1866.

Yesterday, May the 16th, one of us received a note from Mr. John Birmingham of Tuam, stating that he had observed on the night of May 12 a new star in the constellation of Corona Borealis. He describes the star as "very brilliant, of about the 2nd magnitude." Also Mr. Baxendell of Manchester wrote to one of us giving the observations which follow of the new star, as seen by him on the night of the 15th instant.

"A new star has suddenly burst forth in Corona. It is somewhat less than a degree distant from  $\epsilon$  of that constellation in a south-easterly direction, and last night was fully equal in brilliancy to  $\beta$  Serpentis or  $\nu$  Herculis, both stars of about the 3rd magnitude."

Last night, May 16, we observed this remarkable object. The star appeared to us considerably below the 3rd magnitude, but brighter than  $\epsilon$  Coronæ. In the telescope it was surrounded with a faint nebulous haze, extending to a considerable distance, and gradually fading away at the boundary†. A comparative examination of neighbouring stars showed

\* The Astronomer Royal wrote to one of us on the 18th, "Last night we got a meridian observation of it; on a rough reduction its elements are—

R.A. 1866, May 17.....	15 <sup>h</sup> 53 <sup>m</sup> 56 <sup>s</sup> .08,
N.P.D.....	63° 41' 53",

agreeing precisely with Argelander, No. 2765 of "Bonner Sternverzeichniss," declination + 26°, magnitude 9.5." Mr. Baxendell writes on the 21st, "It is probable that this star will turn out to be a variable of long or irregular period, and it may be conveniently at once designated T Coronæ." Sir John Herschel informs one of us that on June 9, 1842, he saw a star of the 6th magnitude in Corona very nearly in the place of this strange star. As Sir John Herschel's position was laid down merely by naked eye allineations, the star seen by him may have been possibly a former temporary outburst of light in this remarkable object.

† On the 17th this nebulosity was suspected only; on the 19th and 21st it was not seen.

